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BOOK IMPOSITION

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THE THEORY AND PRACTICE OF BOOK IMPOSITION

Using the
SYSTEM OF GROUPS-OF-FOUR
As Originally Introduced by
the Author.

With an Index of One Hundred and
Ten Standard Forms.

A Treatise
By CHARLES J. SCHOTT

Seattle, Washington
1910

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Price, \$3.50.

Printed by
The Author

To

WILLIAM B. PRESCOTT

Former President of the
International Typographical Union

In recognition of his prudent and faithful adminis-
tration of its affairs at the trying period
attending the introduction of mechan-
ical composition

A fellow craftsman
Inscribes this work

ACKNOWLEDGMENT.

The author desires to acknowledge obligations to The Chambers Brothers Company of Philadelphia and to The Dexter Folder Company of New York for courtesies received from them.

FOREWORD.

In the following discussion of some of the processes incident to the making of the printed book the author has endeavored to examine critically each fact under observation, to study their relations to one another, and to so classify both as to make a systematic and harmonious presentation of the whole subject of book imposition, . . .

Of necessity, the theoretical exposition extends beyond the needs of present every-day practice; but it is believed that thereby a better understanding will be had of the underlying principles, and that in this—as well as in access to the classified knowledge on the practical side of the work—the printing craftsman of today will acquire some useful aids and a clearer view of the theory and practice of book imposition,

With this purpose, the author makes this contribution to the literature of the typographic profession, and will welcome criticism by his fellow craftsmen of any errors in the work.

CHARLES J. SCHOTT.

Seattle, 1910.

ABBREVIATIONS.

The fractions $\frac{32}{2}$, $\frac{16}{2}$, etc., are read "thirty-two-page half sheet," "sixteen-page half sheet," or "half sixteen," etc. The form 32/2, 16/2, 24/2 also occurs in the same sense.

The figures 1st, 2nd, 4th, etc., are used instead of the more extended "the fifth page of the form (or section, as the case may be)" etc. See, also, p. 52.

Circled Letters.—These indicate folder movements. See p. 32. In closely-printed portions enclosed letters (K-1), (L), etc., are substituted.

Checks—4th, 5th.—See p. 28.

Initial-Page Positions.—See pp. 26, 27.

Movements.—See Table III, p. 33.

INTRODUCTORY.

IN taking up the discussion of book imposition, it is necessary to a clear understanding of the subject that the paper sheet and its manner of folding be given first consideration; for the various arrangements of type pages into forms are but a consequence of variations in the manner of folding the sheet.

For all ordinary purposes the process of sheet folding is begun either (1) by bringing corner upon corner, and thus causing the first fold to fall upon the center line of the sheet, crosswise or lengthwise; or (2) the moved corner is placed upon the line dividing the first and second one-thirds of the sheet, thus causing the first fold to fall upon the line of division between the second and third one-thirds of the sheet. The subsequent folds may be each at a right angle to the one preceding, or they may be all parallel to the first fold; or, again, the right-angle set may finish in two parallel folds, or the parallel set finish in one fold at a right angle to the set; besides still other combinations.

THE VARIOUS FOLDS.

Examining the ordinary long backfold, or so-called "square" book sheet (which, by the way, usually has a width of about two-thirds its length), say one which has been printed from a form of thirty-two consecutive pages, backed, and the sheet then divided, it will be observed that each half sheet contains the full thirty-two pages, sixteen on each side. If the sheet be placed upon the table with page 1 downward, say at the left hand and nearest corner, we have, in the space covered by one leaf of the book to be folded, two pages, page 1 underneath and page 2 upward. If now the opposite corner of the sheet, which contains page 3, is brought over so that page 3 rests upon page 2, then the sheet has been given its first fold and there is a pile

of two leaves containing pages 1 to 4: two pages were in position and the number has been doubled by making one fold. This cumulative process is, of course, going on at the same time in all those portions of the sheet resting upon the table. Again folding the sheet at a right angle to the last fold, so that page 5 is placed upon page 4, there is this time added to the pile four pages—it is just doubled by the second fold—making eight pages, 1 to 8, in position. The third fold, likewise, by bringing 9 to rest upon 8, doubles the eight and places in position pages 1 to 16. The fourth fold again doubles the number of pages in the pile, bringing 17 to rest upon 16, and pages 1 to 32 are piled up in regular order. Were it a sixty-four-page sheet being handled, one more fold—the fifth—would add another thirty-two and make pages 1 to 64 in position.

In other words, illustrating by the $\frac{64}{2}$ section, the first fold places one-half of the perfected section upon the other half, the second fold divides these halves into quarters and places the second two quarters upon the first two quarters, the third fold divides into eighths and places the last four eighths upon the first four eighths, and results in a pile of eight one-eighths of the perfected sheet, each eighth containing one group of four pages on the front and another on the reverse side. Two folds more, placed in this pile of perfected groups, produces the regular sequence of pages of the entire section.

This can be illustrated in figures by—

$$\begin{array}{ccccccccc}
 (1) & & (2) & & (3) & & (4) & & (5) \\
 2 & \vdots & & \vdots & & \vdots & & \vdots & & \vdots \\
 +2=4 & & +4=8 & & +8=16 & & +16=32 & & +32=64
 \end{array}$$

the dotted lines indicating folds as successively taken, as shown by the figures in parentheses.

The same thing occurs with sheets taking their first fold at center line but having all folds

parallel. But in the three-parallel-fold twelve-page sheet, which takes the first fold on the one-third line, the accretion by successive folds is—

$$\begin{array}{lll}
 (1) & & (2) \\
 2 & & +2=4 \\
 & & +2=6 \\
 & & +6=12
 \end{array}$$

the star section interfolding within the leaves of the main section.

A twelve-page sheet with right-angle fold has the same order of accretion, the star section also interfolding between the leaves of the main section.

Another style of sheet for the right-angle machine is found in those twelves which are used to some extent for periodical work. In these the fold is only suitable for side-stitched work, as the interfolded star section consists, when trimmed, of two single leaves, and therefore has no backfold. The order of accretion in folding is—

$$\begin{array}{lll}
 (1) & & (2) \\
 2 & & +0=2 \\
 & & +2=4 \\
 & & +8=12
 \end{array}
 \quad \text{and} \quad
 \begin{array}{lll}
 (1) & & (2) \\
 2 & & +2=4 \\
 & & +4=8 \\
 & & +4=12
 \end{array}$$

There are twenty-four-page sheets whose star sections insert at the center of main section, and others which interfold within the main section. Either style furnishes a good sheet, as the twenty-four (with either arrangement) has all folded backs, suitable for saddle-stitching or sewing if desired.

Two more of the combination handfolded sheets are the twenty-page and the forty-eight-page. Their star sections interfold. They are convenient at times, but their utility is not frequent.

The "Music Fold"—or short backfold, is of frequent occurrence in catalogues, music books, etc. It can be folded with double backfold on the regular right-angle machine, or it can be folded by hand or on specially constructed machines so that there will be but a single fold at the back.

The Legal Fold.—This sheet has its last fold on the short side, or end, of the folded section, like the single short backfold or music, and the four-, eight-, sixteen- and thirty-two-page sections fold in the same manner; but the heads of the odd pages are next the last fold, while the foot of the even-numbered page backing each is in like position. This requires a different imposition, but conforms in all respects to the general principles stated in regard to other forms—with this difference, that instead of the pages of each group-of-four lying pairs head to head (they are square groups), the even-numbered pages are turned head out, so that the members of the pairs lie foot to head and the pairs lie side by side. The last fold being a short fold, and the head being on the short side of the page, the lowest and highest pages of the section lie head to foot instead of side by side. This sheet, though somewhat irregular, is sufficiently used to cause it to be classified as standard. Its adaptability is for legal papers, and, in the smaller-size pages, it is frequently used for envelope folders.

In the Index to Forms, printed at the end of this work, will be found impositions for one hundred and ten sheets; and, while part of them are theoretical (that is, conform to *possible* sheet movements through the folding machine, rather than to *actual* movements now in use), their presence serves to show what the possible limit is in each division, and, in some instances, may even stand as a prediction of further additions in practical construction in simple or combination machines, as specials, if not already in use as such. Further, the presence in the index of those theoretical movements which may now be absent from daily practice will afford an opportunity of comparison with those more familiar, and so, no doubt, facilitate the understanding of this work in its entirety better than if they were omitted. These standard forms include one hundred differently

constructed forms, several of which are repeated when they are applicable to more than one standard folding machine.

In addition to the indexed forms termed standard, there are probably as many more (many of them useful) not of sufficiently frequent occurrence to warrant a discussion here in detail. But, occasion arising for their use, they can easily be constructed in accordance with general principles set forth herein. The eighteen and thirty-six fall within these unclassified sheets. The term "freak" will sufficiently distinguish them.

STAR SECTIONS

A sub-section, otherwise called star section, insert, and infold, is that part of a printed sheet or section of the work which usually consists of one-half the number of pages in the main portion of the section, and in binding is collated and sewed with the latter as one section. A sub-section may inset in the center fold of the larger portion, or it may overset on the outside of the larger, and in other cases it interfolds at one or more places within the folds of the larger other than the center fold.

If the sub-section be so positioned on the printed sheet that it must be cut off before folding the sheet, it generally inserts into the center fold of the main section, though sometimes it is overset.

When the sub- or star section is so positioned that it is not separated before folding the sheet, it almost invariably interfolds within the main section or infolds at its center.

That fold by which the star section is brought into position on the main section must be considered as a collating of the two sections, and not as a fold, when applying the rules of Transpositions, Laying Third Page of Section, and Laying Fifth Page of Section; for these purposes the main and star sections are treated separately.

THE SHEET AT PRESS.

In sending the work to press it must be determined whether it shall be done in forms of consecutive pages which require perfecting immediately, or in a series of "fronts" and "backs" separately so as to allow time to elapse for drying before perfecting.

A sheet of consecutive pages is termed a "half sheet" (of thirty-two, or of sixteen, or of any number used) because, to perfect it, the sheet is turned over and printed the second time and then cut into halves, each containing the whole number of pages in the form. This form is sometimes designated as a "work-and-turn" form. This is the typical sheet, and is the one referred to in this work when speaking of the relations between the different parts of a form or sheet.

It is very often convenient to divide this form of consecutive pages, on account of its size, its proportions, to allow time between first and second printing, or for other reasons. The form of thirty-two consecutive pages—that is, the form producing "half sheets of thirty-two"—when it is thus divided gives two "full sheets of sixteen", or two forms of sixteen pages, one of which contains the pages found in the half of the larger form which includes the first page, the other is that which contains the second page. One of them is the "front" form of this half-size sheet and the other prints upon the reverse; and the sheet as thus finished is exactly the same as results from the half sheet of thirty-two after cutting. It is called a "full sheet" or "sheetwise" form of sixteen. The same, of course, is true of sheets and forms of any number of pages.

The center line of the sheet (usually cross-wise) passing equidistant between the first and second pages of the work-and-turn or half sheet section is, in this work, designated by the term "axis of the sheet" or "axis". It is the line on which the sheet turns in backing, just as

the pivot or center pin upon which a wheel having two or more spokes is the axle of the wheel or the axis of reversing of any pair of the spokes. The sheet is split along this line after the second side has been printed.

Fig. 1

Fig. 1 represents a printed sheet; the dark arrow line is the axis of the sheet, and the dotted line running transversely to the axis is the line of first fold on the standard right-angle folders.

In the sheetwise or full-sheet form or sheet the axis remains just where it would have been if the two halves had been left together in the half-sheet form. This point must be kept in mind clearly. The axis is the line on which the sheet turns in backing and afterwards splits.

THE NATURAL GROUPING OF PAGES.

A further consideration of the folded sheet discloses one fact which is of prime importance when an attempt is made to systematize the work of sheet folding and the imposition of corresponding forms. That fact is the natural grouping of pages according to the needs of the section. This natural unit or group of the folding processes, and therefore of imposition, is the group of four pages. A number of writers on imposition have attempted to treat the pair lying side by side or head to head as the unit; but this arose from inadvertently considering the printed sheet after trimming, instead of before dividing the line of fold. While this treatment resulted in suggesting a check upon the correctness of assembling pages, it effectually prevented, by breaking up the natural unit, the classification — and therefore more complete un-

derstanding—of the processes and principles involved in book imposition.

Recurring to the right-angle-fold half sheet of thirty-two section, because it is the typical sheet, and following the process of folding as indicated on pages 7 and 8, until the second fold has been placed, the pile is composed of four leaves, or pages 1 to 8; but these four leaves are only a one-fourth part of four quarter sheets. Now, if the folds be partly severed, so as to facilitate an inspection of these quarter sheets, it will be found that the bottom quarter, next the table, contains, on its under or outer side, the lowest and the highest pages of the section—a pair—side by side, and it also contains another pair—the two pages which face one another at the center fold of the section. These two pairs constitute one unit or group of four pages. On the upper or reverse side of this quarter sheet, and backing each to each the corresponding pages of the lower side, is found the pair composed of the second page of the section (counting from beginning) and second from end, and also another pair whose pages are respectively second before and second after center fold of section. These two pairs form another unit or group of four pages. The second, the third and the fourth quarter sheets of this pile each reveal a like condition, each pair of each group, respectively, receding from the beginning of section and from end of section, and from center fold of section, in the same manner as the first quarter sheet does. When the two additional folds are placed in this partly folded pile of quarters, the regular sequence of pages is completed in 1 to 32.

It is also found that either one of the eight groups-of-four which compose the thirty two pages of this section may be transposed into any one of the eight group-positions (the others being also shifted to correspond and none of them being turned around), and thus it becomes evident that there are eight possible initial points

for the thirty-two-page section, and, therefore, eight possible methods of folding it and of imposing the form for it.

This leads to the conclusion that the grouping is permanent, and a study of folded sheets, and of book forms in all their variations, shows the fact that when once any four pages are properly grouped, any number of such groups required for a form can be transposed into all possible variations of the original form without breaking up the groups-of-four. Sometimes transposition of pairs occurs within the group, but the group-of-four itself does not break up. In certain of the (L) series, when used for $\frac{1}{2} \frac{2}{2}$, two or more on, the star section, consisting of one group-of-four, splits, in order that the pairs may take position on opposite sides of the axis, as they must to perfect the section when the sheet is turned. But even in these cases the split group maintains its integrity in so far that no part of it enters into combination with any other part of the form.

It is upon the fact of this natural grouping that the System of Groups-of-Four is based, and this treatise on The Theory and Practice of Book Imposition is a study of the reasons for, and an application of the principles connected with, this fact, throughout the entire range of the assembling of type pages into forms for the production of folded sheets.

The group-of-four may be either a square group or a long group. A square group is one in which one pair lies head to head with the other two pages.* In a long group all four pages have heads on a line or backs on a line.

* See remarks about Legal Fold. The same will apply to certain freak sections.

In the (K) series, as in all two-, three- (or any number)-on, the groups-of-four of the center section are complete, with their pairs adjoining; the second, third, etc., sections of the two-or-more-on sheet have the complementary pairs of their groups disjoined and at an equal distance on the opposite side of the complete section. It is simpler and more direct to consider the repetition of each page in a

Whether the groups-of-four in a section are square groups or long groups is determined by the relative direction of the two final folds of that section.

When the last two folds of a section are at a right angle to one another the groups-of-four are square groups.

When the last two folds of a section are parallel, the groups-of-four are long.

CONSECUTIVE FOURS.

From a further examination of the folded sheet it is seen that the consecutive pages of any section bear certain relations of direction and distance, which refer back to the axis of the sheet. The distinction between consecutive fours and groups-of-four, as set forth above, must be kept in mind. Consecutive fours—in so far as they have bearing upon the system of groups-of-four—are of special interest only in the first two sets, and, rarely, in the third. The first eight consecutive pages of a section are also the first pages, respectively, of the eight groups-of-four composing that section—in the case of a thirty-two, for instance. Thus it is seen that, by the group system, it is only necessary to determine the position of one-fourth the number of pages in any form—the remaining three-fourths follow as a necessary consequence, and without any effort of memory on the part of the operator as to their positions. These first eight—one for each group-of-four in the form—are located by the use of a few simple rules which are applicable to all forms.

The third page of the section and the preceding page, the fifth and the preceding page,

two-on or four-on, etc., section as being merely the two halves or four quarters of that page, and the groups-of-four, therefore, as simple complete groups composed of such composite pages. This makes this class of sections conform in every respect to the general rules for groups-of-four in simple sections.

and the ninth and the preceding page, show practically this connection. For the 3rd and the 5th this relation is in all cases in which they appear, while in the case of the 9th it is only in sections of sixteen groups. This relation of 2nd and 3rd depends upon the first fold; of the 4th and 5th upon the second fold, and the 9th upon the third fold. It is necessary only to deduce rules expressing these relations, when, together with one for location of 2nd, and the knowledge of initial point, they form a complete guide to the position sequence of pages in any form it is desired to assemble.

Position of Second Page of Section—Axis.

It is evident that, if the first page of a section be placed in any allowable position on one side of the axis, then, in order that the 2nd may print upon the back of the 1st when the sheet is turned upon its axis—

The second page must lie at a corresponding point on the opposite side of the axis from the first page.

The fourth page of a consecutive four bears the same relation of direction and distance to the third that the second does to the first.

From the foregoing is derived the general proposition—

The direction between the page preceding and the one following any fold is parallel with or at a right angle to the direction between the two pages next preceding that fold as the fold is parallel with or at a right angle to the axis of the sheet

And this is expressed below in rules to determine the position of the 3rd, 5th and 9th pages, the rule for distance apart in each case immediately following that for direction.

The distance of the 3rd from the 2nd, the 5th from the 4th, and the 9th from the 8th, is a

factor in the position of those pages; and, together with the direction, it locates them. Obviously, the 2nd and 3rd, the 4th and 5th, and 8th and 9th, respectively, may be adjoining pages or they may be separated by two or more intervening pages. The general proposition is stated as—

Both the consecutive pages affected by an intervening fold recede from or approach that line of fold as the initial page of the section recedes from or approaches it.

Direction of the Third Page of a Section—
First Fold.

If the perfected sheet takes its first fold at a right angle to the axis, the direction from 2nd to 3rd is at a right angle from 1st to 2nd.

If the first fold is parallel to the axis, the direction from 2nd to 3rd is parallel* to the direction from 1st to 2nd.

Distance—Second Page to Third.

When the initial page of the section lies against the first fold, 2nd and 3rd adjoin one another. For each page lying between the line of the first fold and the initial page† two pages intervene between the 2nd and 3rd.

Direction of the Fifth Page of a Section
—Second Fold.

If the second fold is at a right angle to the axis, the direction from 4th to 5th is at a right angle to the direction from 3rd to 4th.

If the second fold is parallel to the axis, the direction from 4th to 5th is parallel to the direction from 3rd to 4th.

*Along a line parallel to the line between centers of 1st and 2nd, or to that line produced, at any very small distance from it; or, what is practically the same thing, a doubling back along the same line or advancing along an extension of it.

†These pages must be counted on the same side of the axis as the initial page.

Distance—Fourth Page to Fifth.

When the initial page of the section lies against the second fold, 4th and 5th are adjoining. For each page lying between the line of the second fold and the initial page, two pages* intervene between 4th and 5th.

Direction of Ninth and Thirteenth Pages of a Section—Third Fold.

If the third fold is at a right angle to the axis, the direction from 8th to 9th is at a right angle to the line from 7th to 8th, and the direction from 12th to 13th is parallel to that from 11th to 12th.

If the third fold is parallel to the axis, the direction from 8th to 9th is parallel to the direction from 7th to 8th, and the direction from 12th to 13th is at a right angle to that from 11th to 12th.

Distance—8th to 9th, 12th to 13th.

When the initial page of section lies against the third fold, 8th and 9th are adjoining pages. For each page lying between the line of third fold and initial page, two pages intervene between 8th and 9th. 12th and 13th have the same number of intervening pages as 4th and 5th.†

PAGE ASSEMBLING.

Pages may be assembled in various ways, from the unfolded single leaf to the simple or compound or multiple form of any practicable number of pages or size of sheet. This assembling of pages into sections may be—

- (1) A single row of pages, end to end.
- (2) A single row, side by side.
- (3) Two rows, with pages end to end.
- (4) Two rows, with pages side by side.
- (5) Multiples and combinations of the above.

This is illustrated in Table I—Combinations.

*In the case of the (L) 16/2 sections, the second fold passes twice through the perfected sheet (and the third fold four times). The nearest second fold should be used.

†This refers to the sixty-four-page right-angle

TABLE I.—

Pages in Form	A	B	C
2
4
8	1 to 8
16	1 to 16	1 to 16
32	1 to 32	1 to 32

COMBINATIONS.

D	E	F
	<div> <div>1000</div> <div>1001</div> <div>1002</div> <div>1003</div> </div>	
<div> <div>1000</div> <div>1001</div> <div>1002</div> <div>1003</div> </div>	<div> <div>1004</div> <div>1005</div> <div>1006</div> <div>1007</div> </div>	
<div> <div>1008</div> <div>1009</div> <div>1010</div> <div>1011</div> </div>	<div> <div>1012</div> <div>1013</div> <div>1014</div> <div>1015</div> </div>	
<div> <div>1016</div> <div>1017</div> <div>1018</div> <div>1019</div> </div>	<div> <div>1020</div> <div>1021</div> <div>1022</div> <div>1023</div> </div>	
<div> <div>1024</div> <div>1025</div> <div>1026</div> <div>1027</div> </div>	<div> <div>1028</div> <div>1029</div> <div>1030</div> <div>1031</div> </div>	
<div> <div>1032</div> <div>1033</div> <div>1034</div> <div>1035</div> </div>	<div> <div>1036</div> <div>1037</div> <div>1038</div> <div>1039</div> </div>	
<div> <div>1040</div> <div>1041</div> <div>1042</div> <div>1043</div> </div>	<div> <div>1044</div> <div>1045</div> <div>1046</div> <div>1047</div> </div>	
<div> <div>1048</div> <div>1049</div> <div>1050</div> <div>1051</div> </div>	<div> <div>1052</div> <div>1053</div> <div>1054</div> <div>1055</div> </div>	
<div> <div>1056</div> <div>1057</div> <div>1058</div> <div>1059</div> </div>	<div> <div>1060</div> <div>1061</div> <div>1062</div> <div>1063</div> </div>	
<div> <div>1064</div> <div>1065</div> <div>1066</div> <div>1067</div> </div>	<div> <div>1068</div> <div>1069</div> <div>1070</div> <div>1071</div> </div>	
<div> <div>1072</div> <div>1073</div> <div>1074</div> <div>1075</div> </div>	<div> <div>1076</div> <div>1077</div> <div>1078</div> <div>1079</div> </div>	
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<div> <div>1088</div> <div>1089</div> <div>1090</div> <div>1091</div> </div>	<div> <div>1092</div> <div>1093</div> <div>1094</div> <div>1095</div> </div>	
<div> <div>1096</div> <div>1097</div> <div>1098</div> <div>1099</div> </div>	<div> <div>1100</div> <div>1101</div> <div>1102</div> <div>1103</div> </div>	
<div> <div>1104</div> <div>1105</div> <div>1106</div> <div>1107</div> </div>	<div> <div>1108</div> <div>1109</div> <div>1110</div> <div>1111</div> </div>	
<div> <div>1112</div> <div>1113</div> <div>1114</div> <div>1115</div> </div>	<div> <div>1116</div> <div>1117</div> <div>1118</div> <div>1119</div> </div>	
<div> <div>1120</div> <div>1121</div> <div>1122</div> <div>1123</div> </div>	<div> <div>1124</div> <div>1125</div> <div>1126</div> <div>1127</div> </div>	
<div> <div>1128</div> <div>1129</div> <div>1130</div> <div>1131</div> </div>	<div> <div>1132</div> <div>1133</div> <div>1134</div> <div>1135</div> </div>	
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<div> <div>1160</div> <div>1161</div> <div>1162</div> <div>1163</div> </div>	<div> <div>1164</div> <div>1165</div> <div>1166</div> <div>1167</div> </div>	
<div> <div>1168</div> <div>1169</div> <div>1170</div> <div>1171</div> </div>	<div> <div>1172</div> <div>1173</div> <div>1174</div> <div>1175</div> </div>	
<div> <div>1176</div> <div>1177</div> <div>1178</div> <div>1179</div> </div>	<div> <div>1180</div> <div>1181</div> <div>1182</div> <div>1183</div> </div>	
<div> <div>1184</div> <div>1185</div> <div>1186</div> <div>1187</div> </div>	<div> <div>1188</div> <div>1189</div> <div>1190</div> <div>1191</div> </div>	
<div> <div>1192</div> <div>1193</div> <div>1194</div> <div>1195</div> </div>	<div> <div>1196</div> <div>1197</div> <div>1198</div> <div>1199</div> </div>	

The two-page assemblage forms only an unfolded single leaf. In the four-page assemblage is found the first folded sheet, and the basis of all book sections and forms. The nature of this assemblage or group of four pages is discussed on a preceding page. From Table I it is seen that the simple group-of-four, or four-page form, may assume three different shapes, and only three; while the two-group form may have four; the four-group, five; and the eight-group, six proportions. One additional shape or proportional dimension to each doubling of the number of groups-of-four in the form.

Each of these, above the two-page form, is composed of one or more groups, and may be used, in its appropriate place, as a simple form; and compound and multiple forms may be made by combining these various arrangements of groups, as, for instance, in the twelve, twenty-four and forty-eight, with main and infolded sections, and the duplex and quadruple sixteen and duplex thirty-two, and the two- (or more-) on, the latter particularly noticeable in the parallel folds. An inspection of the table will make this apparent, as also the facility with which the shifting of one or more groups brings about changes in proportional dimensions, and the fact that certain forms which appear radically different in the "lay" or imposition are really produced by a mere shifting of the axis to a right angle with its former position, and a corresponding swinging (as on a hinge at the corner) of one-half of the form into its new position.

THE GROUPING FORMULÆ.

In the discussion of the natural grouping of pages, at the beginning of this chapter, the reason for such grouping was disclosed and the manner of grouping reached by implication. The method of writing the grouping formulæ will now be taken up in detail.

section, as it is the only practicable form of sixteen groups in one section.

If a folded sheet (for instance an ordinary long backfold thirty-two-page) be dissected after the second fold has been made, and each group-of-four on each of the quarter sheets be examined, it will be noticed, first, that there are eight groups-of-four, each group composed of a pair of pairs. If, now, the numbers of the pages be written in four vertical columns, and eight lines,* beginning with the lowest number at the head of the first column, and its mate or pair number at the head of the second column, followed on the same line in the third and fourth columns by the numbers of the pages in the pair which completes the same group, the line stands 1-32-17-16. Reversing the quarter sheet, the line for the group found there reads 2-31-18-15; and by repeating the process with each of the quarter sheets and writing them on eight successive lines, there results a table like the lower portion of Fig. 2.

4) 32 (8			
16	16		
+ 1 . . 32 . . 17 . . 16			
2 . . 31 . . 18 . . 15 —			
3 . . 30 . . 19 . . 14 —			
+ 4 . . 29 . . 20 . . 13			
+ 5 . . 28 . . 21 . . 12			
6 . . 27 . . 22 . . 11 —			
7 . . 26 . . 23 . . 10 —			
+ 8 . . 25 . . 24 . . 9			

Fig. 2.

4) 32 (8			
8	8		
.	16		
+ 1 . . 32 . . 25 . . 8			
2 . . 31 . . 26 . . 7 —			
3 . . 30 . . 27 . . 6 —			
+ 4 . . 29 . . 28 . . 5			
+ 9 . . 24 . . 17 . . 16			
10 . . 23 . . 18 . . 15 —			
11 . . 22 . . 19 . . 14 —			
+ 12 . . 21 . . 20 . . 13			

Fig. 3.

Now, this table shows four columns (each line across the four columns being a group) and as many lines as there are groups-of-four in the section. It also shows that, in a simple form or section of consecutive pages, the first column contains, consecutively, (if the section starts with 1) the numbers up to the number of groups, the last column (reading upward) continues

* Four columns because there are four pages in the natural group, and eight lines because there are eight groups in this particular section.

until it includes the page facing the center fold of the sheet; the third column (beginning at the top and reading down) contains the next eight numbers receding from the center fold; and the second column (again reading upward) contains the last eight numbers of the form. This results in the numbers of the pages of a pair being written side by side, and the two pairs composing the natural group-of-four falling on the same line. This method of writing down the consecutive pages will produce a table of the natural groups-of-four in any section of consecutive pages. In the case of insetted sections—for instance, a sixteen within a sixteen—the overset and inset portions are written separately, the overset section being written to its center fold, then the entire inset section, and, returning to the overset section, finish it from the center fold to the end. Fig. 2 shows the thirty-two pages in one section, consecutively, while Fig. 3 shows them in two sections of sixteen for insetting one within the other.

The division of the section into groups, and the manner in which it folds, is indicated by the lines preceding the grouping table proper; and, in Fig. 3, for example, shows that the thirty-two pages divided into groups-of-four equals eight groups, and that the sixteen-page inset is inserted at the center fold of the outer section. The plus sign (+) placed at the left of the group line indicates those groups belonging to the front of sheet, and those marked with a minus sign (—) at the right are those groups forming back of sheet when perfected. A table of this kind, showing the structure of the form in its grouping and folding will be termed its formula.

Following the Index of Forms there is given, for convenient reference, a number of formulæ, especially of those compound forms of more frequent occurrence.

GROUP POSITIONS.

Taking up, now, the assembling of pages into forms to produce folded sheets of consecutively numbered pages, it is seen from what has been said that the beginning or initial point* of the form is determined by the manner in which the sheet folds; and that the positions of the pages on the sheet vary with this initial point and the manner in which the folds are applied in relation to the axis of the sheet.

In the latter portion of this work, into which a practical working summary of the principles—and deduced rules—discussed in this treatise is condensed, an Index of Forms is printed; and, in order to place the results in convenient abbreviated tabular form and facilitate their use, certain symbols are employed, their significance being explained in the text.

The initial point of a form is the first thing that must be known, and, as in forms of different numbers of pages and proportions that point varies, it is needful that a method be fixed by which to describe its positions as they vary. For this purpose the author has adopted the plan of giving a name to each group position, and then, by the use of an arbitrary symbol, designating the location of the initial point, wherever that be. As the regular long backfold thirty-two half sheet form is in common use, that has been adopted as the series of group-positions upon which this map or plan is based. Using the eight group positions of the thirty-two-page form, and commencing at the lower left-hand corner, from left to right and back to left, they are lettered consecutively A to H, as shown in Table II by the solid lined and lettered portion

*The expression "initial point" or "initial page" is used in preference to "first" because the initial or beginning page is, of course, other than the first after the first section of a work; also, in compound or multiple forms, there are two or more sections to each form, and each of these has a beginning point which must be designated in a systematic discussion of imposition.

of the diagram. The shadow groups, lettered with double letters and shown above and to the right of the solid group assembly, are used when additional descriptive names are needed for the initial points in formsexceedingthe eight group spaces.

These group-names and positions are used only for the purpose of accurately describing the location of the initial page of the one or more sections composing any form.

The thirty-two-page long backfold

TABLE II.

		ee	dd
		ff	cc
		gg	bb
		hh	aa
EE	DD	E	D
FF	CC	F	C
GG	BB	G	B
HH	AA	H	A

form occupies group-spaces A to H; the sixteen-page occupies A, B, G, H; the eight-page, A, B; while the four-page uses A only. Certain forms, as the parallel two-(or more-) on, consist of long groups, and each group-of-four occupies one-half the depth and extends across two group-spaces. Hence it is necessary to carefully distinguish between group-space and group-of-four.

It will be noticed in the table that each group-space has lines drawn across it, dividing it into four parts. This indicates that the group-space is occupied by four pages, and these are one complete group-of-four when that is a square group.

It is customary, and generally convenient, in placing the first page of a form, to lay it with the foot toward the operator. As far as practicable this method will be adopted here. Table II shows that, according to this plan, the initial page of the ordinary thirty-two might be laid in either one of the eight group-positions. And it is equally apparent that if it were desired to lay this form in the manner usually done for the hand-fold, i. e., with its first page at the extreme lower left-hand corner of the form, the simplest way of describing that position would be by using the letter A enclosed in a square to indicate the group-space, and further indicate the part of group-space covered by the initial page by placing a disc upon the lower left-hand corner of the square. This gives the symbol to describe the above mentioned position. The simplicity and accuracy of this description is more evident if the initial page be located at or , for instance, as a verbal description of these points, without the use of the group-space plan and symbol-abbreviations, would prove awkward and probably ambiguous.

Now, since in different classes of forms and sections the initial page may fall in either corner of the group-space, there must be four symbols to designate those positions within the group-space, viz.: lower left-hand corner, ; upper left-hand corner, ; lower right-hand corner, ; upper right-hand corner, ; which amounts to a change in the position of the disc. This furnishes a means—by writing the letter-name of the group-space within the square—of expressing unmistakably and in a

manner easily apparent to the eye, the location of the initial page of any form, or section within a form.

THE FIFTH AS A CHECK.

It has been made plain that the relative positions of the different parts of a form vary with the changing positions of the initial page and the relation of the lines of fold to the axis of the sheet. The principles involved are discussed in the chapter preceding, and rules deduced relating to certain pages. For practical purposes, the relative positions of the fourth and fifth pages of a section are all that will cause hesitancy when shifting from one style of form to another. While the principles and rules governing these should be carefully studied and understood, it is desirable to have at hand for reference in daily practice a more abbreviated expression. To this end, the expression of these relations has been symbolized, similarly to that of the initial-page position. This check also appears in the Index of Forms. They are as follows:

$\overline{4th} \overline{5th}$ Indicates that 4th and 5th lie head to head, next to one another.

$\overline{4th} \overline{5th}$ Indicates that 4th and 5th lie head toward head, but with two pages intervening, the number of intervening pages being shown by the solid lines.

$\overline{4th} \overline{5th}$
or
 $\overline{5th} \overline{4th}$ Indicates that those pages lie immediately side by side.

$\overline{4th} \overline{5th}$
or
 $\overline{5th} \overline{4th}$ Indicates that those pages lie side toward side, but with two intervening pages, the number of such pages being shown by the solid lines.

$L \overline{H}$ Indicates that the highest and lowest numbered pages of the section lie side by side.

$\overline{H} \overline{L}$ Indicates that the highest and lowest numbered pages of the section lie head to head.

PRACTICAL APPLICATION.

Now, it is evident that if one knows the initial page position, the relation of 2nd to 1st, of 3rd to 2nd, and of 5th to 4th, he can, by using the grouping table he has prepared for the work in hand, lay down any form without memorizing the position of the pages of the various forms or the awkward alternative of working blindly by a diagram card.

To illustrate by the thirty-two, using the index of a simple form having its initial page at (p. 17), gives the position of 2nd at ; applying the rules for 3rd (pp. 17, 18), locates 3rd at ; the rule for 2nd is also the rule for 4th and gives its position as ; the Index gives 4th || 5th, and therefore 5th is at ; 6th is located at by the rule for 2nd; 7th has the same relation to 6th as 3rd has to 2nd, making its position; 8th is at by the rule for 2nd. There are now eight pages marked upon the stone—the first page number of each of the groups in the form. Looking at the grouping table, as already written, 1-32-17-16 are shown to form the first group. Taking them upon a galley in proper position they are slid into place so that 1st is at . The second group is likewise placed so that 2nd is at ; and the succeeding groups in the same way.

While this may at first seem complicated, it is, in fact, much less so than the commonly-used method, and, after very little practice in the system, the ease and certainty with which the grouping can be made and forms assembled by groups, as well as the readiness with which the full range of imposition practice can

be handled under it, will quickly compensate for the trouble of mastering this system. This is particularly noticeable in handling a piece of work where, for instance, page numbers are dropped (to be given to tipped-in plates) or where corrections are inserted in works by added pages, like 375a, 375b, etc., or where both features appear together.

It is advisable, in handling a book, to write the grouping for a number of forms ahead on a sheet, and cancel off the groups as they are sent to press; especially if several sheetwise fronts are sent down in advance of their backing forms, or the reverse order.

FOLDING MACHINES.

The difference between the "lay" or proportions of one form and another of the same number and size of pages arises from (1) the transposition of the groups—of four of which it is composed, (2) the shape of the groups—of four—long or square, (3) the shifting of the axis of the sheet, or from a combination of two or more of these causes.

There are six ways in which transpositions can be made (in forms having a sufficient number of groups):

Transposition of halves transversely to (across) the axis.

Transposition of halves parallel with the axis.

Transposition of groups in corresponding positions relative to axis of sheet.

Transposition of groups which lie adjoining.

Transposition of pairs within the groups.

Transposition of pairs after splitting the groups.

Also combinations of the above.

Now all transpositions from any given mode of group assembly—a form—are made to meet the requirements of changes in the manner of folding the sheet: hence the different "lay" of forms to suit the movements of the sheet through different folding machines. And thus it is that

the manner of folding the sheet fixes the position of the initial page.

Just as it was found convenient to describe any position in the group-space plan by the use of an abbreviation character, so the varying performance of different folding machines can be described graphically, with the same effect—brevity of expression and facility in reading.

THE RIGHT-ANGLE MACHINES.

The standard right-angle four-fold machine is susceptible of eight movements differing from one another. Four of them are used on the standard machines of this type. There is one style of machine, made by the principal manufacturers, which, though a combination machine, should be specially mentioned here. It does all the regular right-angle folds, and in addition has two pairs of folding rolls so arranged that a third fold parallel to the second or a fourth fold parallel to the third may be substituted for the regular third or fourth folds which are at a right angle to the fold preceding. This arrangement allows the use of duplex sheets two-on in both sixteen-page and thirty-two-page sections. It is built in the several movements.

On the right-angle machine, if a perfected sheet be fed from the feedboard of the folder forward to the front guides and then receives its first fold across the sheet by going down between the folding rolls, and it then turns to the left, where it lies horizontally and receives its second fold, at a right-angle to the first; moving forward as it comes from the second pair of rollers, the third fold, at a right angle to the second, is given it; and, passing from these rollers toward the right, it is given the fourth fold; then this movement of the sheet as it passes through the machine can be described graphically by a combination of arrows, as shown by Fig. 4, in the Table of Movements. This will be distinguished as the "X" movement, and a circled capital letter (X) used

for its abbreviation. Reversing the direction of sheet movement preceding each fold after the first gives the fully reversed (X) or (XX) movement, as shown by Fig. 5, Table III. If the (X) movement is changed by reversing the direction of sheet movement preceding the second and fourth folds the (Y) movement, shown in Fig. 6, results; and this, when fully reversed, becomes (YY), indicated by Fig. 7. The (S) movement, Fig. 8, is, in the case of the thirty-two-page sheet, the one corresponding to that ordinarily used for the hand fold; and when the sheet movements of this are fully reversed (S) becomes (SS), Fig. 9, and in movement corresponds to the hand fold when the form is "made up from the center",—the ambiguous character of this expression as generally used is a good illustration of the points presented in the last chapter. The other two movements are (T), Fig. 10, and (TT), Fig. 11, its complete reverse.

THE PARALLEL-FOLD MACHINES.

These are generally used for "gang" work, where multiple forms are printed, giving three, four or more "on" the sheet, which is then stitched and afterwards cut apart. They are built in two-fold and three-fold patterns, and to make the folds either lengthwise or crosswise of the perfected sheet. In this work those which place the folds crosswise the perfected sheet are designated as (K) movement machines, while those placing the folds lengthwise of the sheet are termed (L) movements. They are shown as Figs. 12 and 13, in Table III, both figures representing the three-fold movement, the eight-page sheet either delivering after the second fold on the three-fold machine or from separate

TABLE III.
DIRECTION OF SHEET MOVEMENTS.

Fig. 4.

Fig. 5.

Fig. 6.

Fig. 7.

Fig. 8.

Fig. 9.

Fig. 10.

Fig. 11.

Fig. 12.

Fig. 13.

machines having only the two-fold capacity. Fig. 12 is the (K) or across-sheet fold, Fig. 13 is the (L) or lengthwise fold. One of each is standard, but there is no reason, except possibly lack of demand, to so limit them, since a reversal of the direction of movement preceding either the second or third fold, would, in special cases, have advantages for certain work. The same may be said of a four-fold parallel movement. In Figs. 12 and 13 the dotted lines indicate the lines of fold, in the order numbered.

Under the heading of Transpositions mention is made of these theoretical movements, as also of the less used right-angle movements.

COMBINATION MACHINES.

There are several standard machines in which combinations are made of the right-angle and parallel movements. The most notable ones are those which handle sheets from duplex forms two-on, the duplex sixteen, the duplex thirty-two, and the quadruple sixteen. It is not necessary to show these combination movements here, but the Index shows all forms which are standard for them.

In addition to these standard machines, specials of any possible combination or design are furnished by the manufacturers, as well as machines of standard type to meet special conditions.

APPLICATION.

The purpose of presenting in the table a graphic description of each of the standard movements, and giving to each a name (the circled letter), is to make it easy to identify any sheet as the product of the machine it comes from, and at the same time to connect that sheet with those groups of forms in the Index under the same name and the result of the same movement. As, for instance, if a sheet with four right-angle folds be at hand, and by inspection it is identified as a (Y) movement, from the Index it is known that the machine will fold eight different standard forms of the sizes and imposition there shown, five of them being regular long backfold, and three being double short backfold; besides these—if the machine has attachments for substituting the parallel third and fourth folds for those at right angle—it will fold three additional sheets, from duplex two-on forms. And so of the other movements. A knowledge of the machine's performance on the thirty-two shows, in con-

nection with the Index, what it will do in its full range of standard sheets.

Many irregular or "freak" impositions may also be folded by these movements.

TRANSPOSITIONS.

On preceding pages transpositions of the several parts of forms have been mentioned and reasons given for the same. Following is presented a series of rules for transpositions in both the right-angle and parallel forms:

THE RIGHT-ANGLE FOLDS.

The $\frac{3}{2}$, or Half Sheet of Thirty-Two.

Long Backfold and Double Short Backfold

There are seven ways of making transpositions from the (S) movement thirty-two-page forms having their initial pages at and respectively, as follows:

- 1.—Reversing direction of sheet movement preceding second fold only.

This requires a transposition of entire halves of form (without turning) in a direction parallel to axis of sheet.

- 2.—Reversing direction of sheet movement preceding third fold only.

This requires in the form transposition of groups-of-four lying side by side, in each half separately,—i. e., at a right angle to axis of sheet.

- 3.—Reversing direction of sheet movement preceding fourth fold only.

This requires in the form a transposition of entire halves in a direction parallel to axis of sheet, and then a further transposition, transversely to axis, of the groups-of-four in corresponding positions relative to axis.

- 4.—Reversing direction of sheet movements preceding second and third folds.

This requires in the form a transposition of entire halves in a direction parallel to axis of sheet, and then a further transposition of groups-of-four lying side by side in each half separately.

- 5.—Reversing the direction of sheet movements preceding second, third and fourth folds

This requires in the form a transposition (without turning) of entire halves transversely to axis of sheet.

- 6.—Reversing direction of sheet movements preceding both second and fourth folds.

This requires in the form transposition, transversely to the axis, of groups-of-four in corresponding positions relative to the axis.

- 7.—Reversing direction of sheet movements preceding both third and fourth folds.

This requires in the form transposition of entire halves in a direction parallel to axis of sheet, and then transposition of entire halves transversely to axis.

The $\frac{1}{2} \frac{6}{2}$, or Half Sheet of Sixteen.

Long Backfold and Double Short Backfold.

There are three ways of making transpositions from the (Y) movement sixteen-page form. This form has its initial page at for the long backfold. They are the following:

- 8.—Reversing direction of sheet movement preceding second fold only.

This requires in the form transposition of entire halves (without turning) in a direction parallel to axis of sheet.

- 9.—Reversing direction of sheet movement preceding third fold only.

This requires in the form transposition of

entire halves in a direction parallel to axis of sheet, and then transposition of entire halves transversely to axis.

- 10.—Reversing direction of sheet movements preceding both second and third folds.

This requires in the form a transposition (without turning) of entire halves transversely to axis of sheet.

The $\frac{8}{2}$, or Half Sheet of Eight.

Long Backfold and Double Short Backfold.

This form has but one transposition, the following:

- 11.—Reversing direction of sheet movement preceding second fold.

This requires in the form a transposition (without turning) of entire halves transversely to axis of sheet.

THE PARALLEL FOLDS.

There are four possible combinations of movement (and therefore three transpositions from the standard) on each of the three-parallel-fold machines for the sixteen-page sheet, and eight possible movements for the twelve-page sheet.

Only one, however, of the (K) and one of the (L) series for each of these sheets are standard.

The index and transpositions for all are given, and those not standard are distinguished by a subscript addition to the movement name, as

(L-1), (K-1), etc. A careful study of these non-standard movements will prove useful.

The two-fold parallel, folding eight pages, has two possible movements for each series, the second being a complete reversal of the first, and therefore equivalent to changing the feed-guide edge and turning the sheet around. This is true of the sixteen-page and twelve-page sheets, as well as the eight, for the standard and

their fully reversed movements in both series. The imposition, of course, is different.

The point of difference between any form of the (K) series and the one corresponding to it in the (L) series is that in the former the lines parallel with the headlines of backing pages are parallel with the axis of the sheet, while in the latter the lines parallel with the headlines are at right angles to the axis. In other words, the axis in the (K) series is at a right angle to its position—relative to headlines—in the (L) series; and this amounts to the swinging—as on a hinge at the corner—of one-half of the form until its former width has been doubled and its former length halved, as described on p. 22. The choice, then, between the across-sheet-fold form and that for lengthwise fold is contingent upon the proportional dimensions of the sheet and pages to be handled. Printing sheetwise, instead of in the consecutive-page form, tends to reduce the proportional differences in forms of these two series in the range of work usual to them.

The $\frac{1}{2} \frac{6}{2}$ of the (K) Series (4-on).

The normal (K) $\frac{1}{2} \frac{6}{2}$ has its initial page(s) at and . There are three transpositions from this form, as follows:

- 12.—Reversing direction of sheet movement preceding second fold only.

This requires in the form a transposition (without turning) of entire halves of form in a direction parallel to the axis of sheet.

- 13.—Reversing direction of sheet movement preceding third fold only.

This requires in the form the transposition (within the group) of the two pairs composing each group-of-four.

14.—Reversing direction of sheet movements preceding both second and third folds.

This requires in the form the transposition of entire halves in a direction parallel to axis of sheet, and then transposition of the two pairs composing each group-of-four.

The application of Rule 14 produces the fully reversed movement, which is indicated by (KK).

The $\frac{1}{2} \frac{2}{2}$ of the (K) Series (4-on).

This is a three-parallel crosswise-fold sheet. With appropriate imposition it may take its first fold either at the right or left of the center* line.

(K) is used here to designate the standard $\frac{1}{2} \frac{2}{2}$ having its first fold at the left of center line across the perfected sheet, the sheet advancing by two successive movements to the left, preceding the second and third folds. This is the standard movement of the across-sheet three-parallel-fold machine..

The form for this, and all the (K) $\frac{1}{2} \frac{2}{2}$ series, occupies group-spaces as shown by

HH	GG	FF
AA	BB	CC
H	G	F
A	B	C

Fig. 14.

The standard (K) $\frac{1}{2} \frac{2}{2}$ four-on has its initial page(s) at and , and the first page(s) of its star section, which is the third of the form, at and .

Fig. 15.

A fully reversed sheet, which is designated (KK), takes its first

*In speaking of the first fold as being to the right or left of center of sheet as fed to folder, it will be assumed that the operator is standing with his right side to the feed-board, facing forward and looking across the sheet as it lies against the front stop, as shown in Fig. 15, the feathered end of arrow marking position of feedboard.

fold at the right of center line across the perfected sheet, and advances by two movements to the right preceding the second and third folds.

The Intermediate (K) $\frac{1}{2}$ $\frac{2}{2}$ Folds

There are two other possible movements on the three-parallel crosswise-fold machine, and these four motions result in twice that number when the first fold is applied at the right and left of center line of their respective sheets, thus producing, in addition to the two above mentioned, six folds intermediate between (K) and (KK) for the $\frac{1}{2}$ $\frac{2}{2}$. They require an appropriate imposition for each, except that (K-1) and (K-3) have the same imposition and produce the same resulting fold of sheet by inverting the latter sheet when placing it upon the folder. The same is true of the pair (K-4) and (K-6). This pairing, however, does not have the effect of eliminating those motions when the sheets, respectively, take their first fold at the reverse side of center.

These six intermediate folds all have their star sections beginning with the fifth page of the form, and therefore a regrouping of the form is required from that used on the standard (K) $\frac{1}{2}$ $\frac{2}{2}$ and its reverse, (KK) $\frac{1}{2}$ $\frac{2}{2}$. In all six the star section inserts at the center fold of the main section of eight pages.

These intermediate forms will be designated as (K-1), (K-2), (K-3), (K-4), (K-5) and (K-6). For the purpose of defining transpositions, (K-1) will be used as the standard of these intermediates. The sheets from the first three take their first fold at the left of the center line, while those from the last three receive their first fold at the right of center line.

Some of the intermediate folds produced are, in some respects, not as desirable as the standard for general purposes; but compactness of construction in machine, as well as special features in the work to be produced, might recommend them. These movements are likely to be met, if at all, only as "specials". One of them (it might even be expanded to a four-fold for that purpose) would prove desirable for map work or certain classes of "folders" requiring a similar folding of the sheet. This is also true of the (L) series intermediate folds.

The Transpositions (K) $\frac{1}{2}$ $\frac{2}{2}$ Series.

- 15.—(K) Becomes Fully Reversed, or (KK) by making the first fold at the right of center line, and by reversing direction of sheet movements preceding both second and third folds.

This requires in the form a transposition of the main and star sections, and then a further transposition of the pairs within each group-of-four of the main section.

- 16.—(K) Becomes (K-1) by reversing the direction of sheet movement preceding second fold only, the first fold being taken at left of center. This requires in the form a regrouping of the entire twelve pages so that (K-1) has the initial page(s) of its main section at and and its star section begins with the fifth page(s) of and the form at

- 17.—(K) Becomes (K-2) by reversing the direction of sheet movement preceding third fold only, the first fold being taken at left of center. This requires, in the (K-1) form, a transposition of the pairs within each group-of-four of the main section, and then a transposition and turning of the pairs within the star-section group.

- 18.—(K) Becomes (K-3) by reversing the direction of sheet movements preceding both second and third folds, the first fold being taken at left of center.

This requires no change in the (K-1) form, but the sheet is inverted when placing upon the folding machine. (Inverting the sheet reverses the end guide edge.)

- 19.—(K) Becomes (K-4) by placing the first fold at right of center line.

This requires, in the (K-1) form, a transposition of the main and star sections, and then the transposition of the pairs within each group-of-four of the main section. (The sheet is placed upon the folder in inverted position. Inverting sheet reverses end guide edge.)

- 20.—(K) Becomes (K-5) by reversing the direction of sheet movement preceding second fold only, and taking the first fold at right of center. This requires, in the (K-1) form, a transposition of the star and main sections, and then a transposition and turning of the pairs within the star-section group.
- 21.—(K) Becomes (K-6) by reversing the direction of sheet movement preceding the third fold only, and taking the first fold at right of center. This requires, in the (K-1) form, a transposition of the main and star sections, and then the transposition of the pairs within each group-of-four of the main section. This gives the same imposition as (K-4).

The $\frac{8}{2}$ of the (K) Series (4-on).

The standard of this movement (K) has its initial page(s) at and . The only reversal of movement is a complete one, becoming (KK).

- 22.—Reversing the direction of sheet movement preceding second fold.
- This requires in the form the transposition of the two pairs composing each group-of-four.

The $\frac{1\ 6}{2}$ of the (L) Series (4-on).

The $\frac{1\ 6}{2}$ form for the standard (L) movement has its initial page(s) at and . There are three transpositions from this form, as follows:

- 23.—Reversing direction of sheet movement preceding second fold only.
- This requires in the form the transposition of the groups-of-four in each half taken separately.

24.—Reversing direction of sheet movement preceding third fold only.

This requires in the form the transposition of the two pairs composing each group-of-four.

25.—Reversing direction of sheet movements preceding both second and third folds.

This requires in the form the transposition of the groups-of-four in each half separately, and then the transposition of the two pairs composing each group-of-four.

The $\frac{1}{2} \frac{2}{2}$ of the (L) Series (4-on).

This is a three-parallel lengthwise-fold sheet. With appropriate imposition it may take its first fold at either right or left of the center* line lengthwise of per-

fectured sheet. (L) will be used to designate the standard $\frac{1}{2} \frac{2}{2}$ having its first

H	G	F	E	hh	gg
A	B	C	D	aa	bb

Fig. 16.

fold at the left of the center line, the sheet advancing by two successive movements to the left preceding the second and third folds. The form for this, and all the (L) $\frac{1}{2} \frac{2}{2}$ series occupies group-spaces as shown in Fig. 16. This form

has its main section initial page(s) at and , and the first page(s) of its star section, which is the third page of the form, at and .

A fully reversed fold will be designated as (LL). It takes

Fig. 17.

*It will be assumed that the operator is facing toward the feedboard, with left side toward the machine; then a fold to left of center line would be the one nearest the front gauges, and the fold to right is the one nearest feedboard. (See Fig. 17.)

its first fold at the right of the center line and advances by two successive movements to the right preceding the second and third folds.

The Intermediate (L) $\frac{1}{2}$ $\frac{2}{2}$ Folds.

Similarly to the (K) series, there are six intermediate folds between (L) and (LL), each requiring a different imposition. They all have their star sections on the fifth page of the form, inserting at the center of the main section, and the twelve pages must therefore be regrouped, (L-1), (L-2), (L-3) distinguish those receiving first fold at left of center line, and (L-4), (L-5), (L-6) those taking first fold at right of center. (L-1) will be used as the standard in defining transpositions.

The Transpositions (L) $\frac{1}{2}$ $\frac{2}{2}$ Series.

- 26.—(L) Becomes Fully Reversed, or (LL) by making the first fold at the right of center line, and by reversing direction of sheet movements preceding both second and third folds.

This requires in the form the splitting* of the group-of-four composing the star section into its constituent pairs, and then the transposition of these pairs each with the group-of-four of the main section lying on the same side of the axis, and, further, a transposition of the pairs within each group-of-four of the main section.

- 27.—(L) Becomes (L-1) by reversing the direction of sheet movement preceding second fold only, the first fold being taken at left of center. This requires in the form a regrouping of the entire twelve pages so that (L-1) has the initial page(s) of its main section at and and its star section begins with the fifth page(s) of and the form at

- 28.—(L) Becomes (L-2) by reversing the direction of sheet movement preceding third fold

*See comments on p. 15.

only, the first fold being taken at left of center. This requires, in the (L-1) form, a transposition of the pairs within each group-of-four of the main section, and then a transposition of the pairs of the star-section group (which is already split).

- 29.—(L) Becomes (L-3) by reversing the direction of sheet movements preceding both second and third folds, the first fold being taken at left of center.

This requires, in the (L-1) form, the transposition of entire halves transversely to axis. (The sheet is inverted when placed upon the folder.)

- 30.—(L) Becomes (L-4) by placing the first fold at right of center line.

This requires, in the (L-1) form, the transposition of entire halves transversely to axis; then a splitting of the star-section group into its component pairs, and the transposition of those pairs each with the group-of-four of the main section lying on same side of the sheet axis; and further, the transposition of the pairs within each group-of-four of the main section, (This sheet is placed upon the folder in an inverted position.)

- 31.—(L) Becomes (L-5) by reversing the direction of sheet movement preceding the second fold only, and taking the first fold at right of center line.

This requires, in the (L-1) form, the transposition of each pair of the star section with the group-of-four of the main section lying on the same side of the sheet axis, and then a transposition with one another of the pairs of the star section.

- 32.—(L) Becomes (L-6) by reversing the direction of sheet movement preceding the third fold only, and taking the first fold at the right of center line.

This requires, in the (L-1) form, the transposition of the pairs of the star section each with the group-of-four of the main section lying on the same side of the axis, and then a transposition of the pairs within each group-of-four of the main section.

The $\frac{8}{2}$ of the (L) Series (4-on).

The standard of this movement has its initial pages at D and E. The only reversal of movement is a complete one, becoming (LL)

33.—Reversing the direction of sheet movement preceding second fold.

This requires in the form the transposition of the two pairs composing each group-of-four.

Note.—The (L) series is here treated at length, in its several forms, as a distinct series or movement; but this is only when in “half-sheet” or consecutive-page forms. When the forms and sheets are divided at the axis, the halves of each member of the (L) series are identical with those of the corresponding member of the (K) series; and their perfected sheets have, therefore, the same motions in passing through the folder,—one, however, folding lengthwise and the other crosswise. It might thus appear that this separate discussion of the (L) series is a needless repetition, as its forms are the same as (K) forms with the mere swinging of the axis to a right angle with its former position. But, as these lengthwise forms are frequently desired as consecutive-page forms, it was thought better to index their direct imposition separately. Besides, consideration of the (K) and (L) folds as separate series, as has been done above, affords the best possible opportunity to make a comparative study of the effects of swinging the axis to a right angle with its former position, both in the arrangement of the pages themselves and the transpositions they undergo in changing from one member of the series to another. It is, as well, an illustration of the difference between the so-called “long” forms and the “square” or ordinary forms of the right-angle folds.

THE COMBINATION FOLDS.

Since these are all arbitrarily combined movements, transpositions from one to another can not advantageously be discussed here in detail. Application of the general principles governing other forms will suffice.

PREPARING THE FORM
FOR PRESS.

DRESSING THE FORM.

The pages having been arranged in proper position, or "imposed" on the stone, the next step in preparing it for press is "dressing out" with suitable furniture around the pages, apportionment of space in backs, heads, trimfolds and at axis, then squaring and locking the form.

Since, owing to a number of causes, it is quite likely that slight changes in the form will have to be made on press in the process of making register, that arrangement of furniture around the pages is best which will make it easy to change any part of the form with the least disturbance of the remainder, and also which will accommodate those permissible variations in width or length, occasioned by a projecting cut or similar cause, which are of such frequent occurrence. The back is the edge of the page which lies against the last fold of the sheet (in certain forms the heading of the page may be along this edge), the heads obviously being at a right angle thereto. The back furniture should be a little longer than the normal page, the head furniture slightly less than the width of the type page, and there should be a foot-piece to each page of the same length as the head furniture but narrower—two or three ems is a good width. The widths of the backs and heads are preferably made up of two pieces. In this way changes for varying widths and length of pages, or for register adjustments, can be made to affect the desired page with the minimum interference with the remainder of the form. This gives, for any given work, a standardized dress-out for the forms, easily varied, but avoiding the reconstruction practically for each section that other methods involve. The furniture at the trimfolds is the length of two pages plus the heads and foot allowance,

and double the page width plus backs; the remainder as best suits chase and crossbars. Fig. 18, half of a thirty-two-page form, illustrates the best practice in dressing out a form of book pages.

Steel quoins are in such general use as to have nearly supplanted the bevel-stick and

Fig. 18.

wooden quoins, still, when the best results are desired, the older method has advantages, though a little slower in handling. The modern long wooden quoin has greater bearing surface, and is the best pattern. They are used in pairs with straight furniture instead of bevel-sticks.

PRESS GRIPPER EDGE.

In full sheet, or sheetwise, forms it is necessary, in order to obtain folding register, that the

sheet be so fed to true edges—guide and gripper edges—on the press that they be the same as the guide edges on the folder. Some folders are capable of carrying side guides either right or left, some only on one end of the perfected sheet as fed to folder. While it is the duty of the pressman to see that the true edges from the press gauges conform to the requirements of the machine on which the work is to be folded, it is well for the imposer to be vigilant, as it may prevent trouble and loss when the work reaches the bindery. It directly concerns the imposer in so far that, in locking a divided or sheetwise form, the edge next the grippers of the press is that lying at the axis—or turning and dividing line—of the sheet. In the half sheet or consecutive-page form the press-gripper edge, as the form is locked, must be made to conform to the folder end gauge.

MAKING MARGINS.

It has become the custom to work by the rule or tape measure and take for granted the size of sheet as stated in figures. This is well enough if proper precautions are taken. In practice, however, paper, except of the higher grades, does not run true to its catalogue dimensions throughout the lot—at least this is a frequent occurrence. There are variations in size, and they must be taken into account when making the margins. The smallest sheet in the lot fixes the space in the trimfolds and at the axis of the sheet. The trimmed size of the finished job limits the back and head spaces. The manner of binding—sewed, side-stitched or ribbon-laced—also has to do with the back-margin space. These points must all be determined before the margins can be rightly made.

As each page, when printed, has two margins on the sides—a back and trim edge—it is evident that, if the printed page is to set exactly in the center of the paper page as trimmed, there will be in the back space between any two pages just two margins, or the difference be-

tween the type page and the trimmed paper page; and, in the same conditions, the trim edges of any two pages will have between them this same space, and in addition the allowance for trimming. What is true of making the margins for the sides of the pages is also true in making the margins at the head and foot of the pages.

Now, if the type page, instead of being exactly in the center of the trimmed paper page, is to be nearer the head or backfold, then, for each unit of space (say six-point slug) of excess margin on the outside or foot of any one page, half that space must be deducted from the head or back furniture. The spaces for exact centering on trimmed-size page and trim allowances should first be computed and then this decentering reduction subtracted. Measurements for decentering should be made from page center (of the normal page), not from edges; it causes less confusion, especially with forms having irregular-size pages.

In calculating for the spaces at trimfolds and at the axis, it must not be forgotten that, in handling the paper in printing and folding, there is more or less "batter" of the outside edges of the sheet. The trimfold edges and those at division line will not be subject to this battering, and therefore less space is required for trim at these points than on the outside edges. If attention is not paid to this point it will frequently happen that the binder will find it difficult to get the required margins on the work without the defective portions of the sheet falling within the trim line, while at the same time wasting perfect stock unnecessarily placed at the trimfolds and division line.

Trimming folded sheets of a large number of pages, or on very thick paper, or where several sections are inserted, when the work is to be saddle-stitched, requires a reduction of back or head margins, or both, in the center portions of the work—if the margins be narrow—to comply with the trimming conditions. A gradual

reduction by steps of four consecutive pages toward center of form is the better way.

SQUARING THE FORM.

When the form has been dressed out and the quoins fitted and locked moderately tight, the form should be tried with the steel square and straight-edge. The straight-edge should be applied to the backs and heads of each line of pages, to verify their perfect allignment, and, if not true, leads, brasses or strips of pressboard should be used to correct the variations. The square should then be applied to the backs and heads and to the press gripper edge and heads, to see that the angle between these is a true right angle, and adjustments made, if necessary. It is at this point that defects in chases or crossbars are best detected and remedied. No form of book pages should be sent to press without passing this test.

After thus squaring, the form may be sufficiently tightened for lifting and delivery to press.

AT THE PRESS—MAKING REGISTER.

While the register has been made as accurate as possible on the stone, by the use of straight-edge and square, it is almost always affected more or less by the pressman's operations, particularly by the pressure of the bed clamps upon the outside of the chase. The first test upon the press should be to see whether the "square" of the form as it left the stone has been affected as above. This can be most conveniently done by backing or turning a sheet to register, when the adjustments necessary can readily be seen. This should be done on sheetwise forms (which, of course, are not intended to back upon themselves) as well as in the case of consecutive-page forms, since, if one side of a sheet be printed "out of square" it will entail a great deal more labor to make all the adjustments of register on the finishing form; besides, defective work must result. To print the first side of a sheetwise form without so testing and per-

fecting its "square" is extremely bad practice.

It sometimes happens that, after making such changes as the trial sheet indicates necessary to get register, the results are erratic—the alteration of form producing effects other than those sought, differing from sheet to sheet. Spring of the form, because of excessive pressure in clamping on bed of press, may account for it; or the cause may not be in the form, but result from the dragging of the sheet by guard-bands, or sagging, or by buckling of the sheet by manner in which it is taken from feedboard by the grippers. A form properly squared on the stone should not be considerably altered at press until these probable causes of defect are eliminated.

THE INDEX TO FORMS.

The tables on the following pages present the Index mentioned on pp. 10, 29 and 34:

The (X), (XX), (Y) and (YY) movements, being standard, are each indexed for their five regular long backfold and three double short backfold single-section forms, also for the three duplex two-on forms. The initial point of the $\frac{8}{2}$ appears twice alike, as it can only fall in group-spaces A and B. The four other movements, (S), (SS), (T) and (TT), not being standard, are not entered at length in the Index, because the $\frac{1}{2}$ 6, the $\frac{1}{2}$ 2 and $\frac{8}{2}$ are already shown in the above movements indexed in full. But the $\frac{3}{2}$ 2 music and the $\frac{3}{2}$ 2 and $\frac{2}{2}$ 4 long backfold of each are given, since it is only in the fourth fold that these movements differ from the corresponding member of the first set. This can readily be seen in Table III, on p. 33.

Note.—In the Index the figures 3rd, 5th, etc., after the word "Star" in column headed "Initial Point" indicates the page of the form on which the star section begins. In the column "Checks" it means the page of the section concerned, counting from the first of that section.

INDEX TO FORMS.

HANDFOLDED "SQUARE."

Long Backfold—Right Angle.

No.	No. of Pages in Form.	Initial Point	Checks.	
			5th—4th	L—H
1	$\frac{6\ 4}{2}$		$\frac{\overline{4}S}{4th} 9 8$	L H
2	$\frac{3\ 2}{2}$		5th 4th	L H
3	$\frac{1\ 6}{2}$		$\frac{\overline{4}S}{4th}$	L H
4	$\frac{8}{2}$		5th 4th	L H
5	$\frac{4}{2}$		...	L H
6	$\frac{4\ 8}{2}$	Main Star= 5th ...	5th 4th $\frac{\overline{4}S}{4th}$	L H
7	$\frac{2\ 4}{2}$	Main Star= 3rd ...	4th 5th 5th 4th	L H
8	$\frac{2\ 4}{2}$	Main Star= 5th ...	$\frac{\overline{4}S}{4th}$ 5th 4th	L H
9	$\frac{1\ 2}{2}$	Main Star= 3rd ...	5th 4th ...	L H

INDEX TO FORMS.

HANDFOLDED MUSIC.

Single Short Backfold,

No.	No of Pages in Form.	Initial Point.	Checks.	
			5th—4th	L-H
10	$\frac{3\ 2}{2}$		$\frac{\overline{4}S}{4th}$	L H
11	$\frac{1\ 6}{2}$		$\frac{\overline{4}S}{4th}$	L H
12	$\frac{8}{2}$		5th 4th	L H
13	$\frac{4}{2}$		...	L H

THE LEGAL FOLD.

Handfolded.

No.	No. of Pages in Form.	Initial Point.	Checks.	
			5th—4th	L-H
14	$\frac{3\ 2}{2}$		4th $\overline{4}S$	$\frac{H}{L}$
15	$\frac{1\ 6}{2}$		5th $\overline{4}S$	$\frac{H}{L}$
16	$\frac{8}{2}$		$\frac{4th}{5th}$	$\frac{H}{L}$
17	$\frac{4}{2}$		...	$\frac{H}{L}$

INDEX TO FORMS.

MACHINE—RIGHT-ANGLE.

Long Backfold.

No.	No. of Pages in Form.	Initial Point	Checks.	
			5th—4th	L—H
18	$\frac{3 \ 2}{2}$		4th 5th	L H
19	$\frac{1 \ 6}{2}$		$\overline{4} \ 5$ 4th	L H
20	$\frac{8}{2}$		5th 4th	L H
21	$\frac{2 \ 4}{2}$	Main Star= 3rd ...	$\overline{4} \ 5$ 4th 5th 4th	L H
22	$\frac{1 \ 2}{2}$	Main Star= 3rd ...	5th 4th	L H

PLUS TWO ADDITIONAL FOLDS
(Substituting Parallel Third or Fourth.)

23	$2 \times \frac{3 \ 2}{2}$ Two-on		$\overline{4} \ 5$ 4th	L H
24	$2 \times \frac{2 \ 4}{2}$ Two-on	Main Star= 9th ...	$\overline{4} \ 5$ 4th 5th 4th	L H
25	$2 \times \frac{1 \ 6}{2}$ Two-on		5th 4th	L H

INDEX TO FORMS.

MACHINE—RIGHT-ANGLE.

Long Backfold.

No.	No. of Pages in Form.	Initial Point	Checks.	
			5th—4th	L-H
26	$\frac{3\ 2}{2}$		4th 5th	L H
27	$\frac{1\ 6}{2}$		$\frac{4\ 5}{4\text{th}}$	L H
28	$\frac{8}{2}$		5th 4th	L H
29	$\frac{2\ 4}{2}$	Main Star= 3rd ...	$\frac{4\ 5}{4\text{th}}$ 5th 4th	L H
30	$\frac{1\ 2}{2}$	Main Star= 3rd ...	5th 4th	L H

(XX)

PLUS TWO ADDITIONAL FOLDS
(Substituting Parallel Third or Fourth.)

31	$2 \times \frac{3\ 2}{2}$ Two-on		$\frac{4\ 5}{4\text{th}}$	L H
32	$2 \times \frac{2\ 4}{2}$ Two-on	Main Star= 9th ...	$\frac{4\ 5}{4\text{th}}$ 5th 4th	L H
33	$2 \times \frac{1\ 6}{2}$ Two-on		5th 4th	L H

INDEX TO FORMS.

MACHINE—RIGHT-ANGLE.

Long Backfold.

No.	No. of Pages in Form.	Initial Point	Checks.	
			5th—4th	L—H
34	$\frac{3 \ 2}{2}$		5th 4th	L H
35	$\frac{1 \ 6}{2}$		$\overline{4} \overline{5}$ 4th	L H
36	$\frac{8}{2}$		5th 4th	L H
37	$\frac{2 \ 4}{2}$	Main Star= 3rd ...	$\overline{4} \overline{5}$ 4th 5th 4th	L H
38	$\frac{1 \ 2}{2}$	Main Star= 7th ...	5th 4th	L H

(Y)

PLUS TWO ADDITIONAL FOLDS

Substituting Parallel Third or Fourth.

39	$2 \times \frac{3 \ 2}{2}$ Two-on		$\overline{4} \overline{5}$ 4th	L H
40	$2 \times \frac{2 \ 4}{2}$ Two-on	Main Star= 9th ...	$\overline{4} \overline{5}$ 4th 5th 4th	L H
41	$2 \times \frac{1 \ 6}{2}$ Two-on		4th 5th	L H

INDEX TO FORMS.

MACHINE—RIGHT-ANGLE.

Long Backfold.

No.	No. of Pages in Form.	Initial Point	Checks.	
			5 th —4 th	L—H
42	$\frac{3\ 2}{2}$		5 th 4 th	L H
43	$\frac{1\ 6}{2}$		$\frac{\overline{4}5}{4^{\text{th}}}$	L H
44	$\frac{8}{2}$		5 th 4 th	L H
45	$\frac{2\ 4}{2}$	Main Star= 3 rd ...	$\frac{\overline{4}5}{4^{\text{th}}}$ 5 th 4 th	L H
46	$\frac{1\ 2}{2}$	Main Star= 7 th ...	5 th 4 th	L H

PLUS TWO ADDITIONAL FOLDS
(Substituting Parallel Third or Fourth.)

47	$2 \times \frac{3\ 2}{2}$ Two-on		$\frac{\overline{4}5}{4^{\text{th}}}$	L H
48	$2 \times \frac{2\ 4}{2}$ Two-on	Main Star= 9 th ...	$\frac{\overline{4}5}{4^{\text{th}}}$ 5 th 4 th	L H
49	$2 \times \frac{1\ 6}{2}$ Two-on		4 th 5 th	L H

INDEX TO FORMS.

MACHINE—RIGHT-ANGLE.
Long Backfold.

No.	Movement and No. of Pages in Form	Initial Point.	Checks.	
			5th—4th	L-H
50			5th 4th	L : H
51	(S)	Main Star = 7th	$\overline{4} \downarrow S$ 4th 5th 4th	L : H
52			5th 4th	L : H
53	(SS)	Main Star = 7th	$\overline{4} \downarrow S$ 4th 5th 4th	L : H
54			4th 5th	L : H
55	(T)	Main Star = 7th	$\overline{4} \downarrow S$ 4th 5th 4th	L : H
56			4th 5th	L : H
57	(TT)	Main Star = 7th	$\overline{4} \downarrow S$ 4th 5th 4th	L : H

INDEX TO FORMS.

MACHINE-FOLDED MUSIC.

Right-Angle—Double Short Backfold.

No.	Movement and No. of Pages in Form	Initial Point.	Checks.	
			5th—4th	L-H
58	$\frac{3}{2}$ $\frac{2}{2}$		$\overline{4} \overline{1} \overline{5}$ $\underline{4th}$	$\frac{H}{L}$
59	$\frac{1}{2}$ $\frac{6}{2}$		5th—4th	$\frac{H}{L}$
60	$\frac{8}{2}$		$\overline{4} \overline{1} \overline{5}$ $\underline{4th}$	$\frac{H}{L}$
61	$\frac{3}{2}$ $\frac{2}{2}$		$\overline{4} \overline{1} \overline{5}$ $\underline{4th}$	$\frac{H}{L}$
62	$\frac{1}{2}$ $\frac{6}{2}$		5th—4th	$\frac{H}{L}$
63	$\frac{8}{2}$		$\overline{4} \overline{1} \overline{5}$ $\underline{4th}$	$\frac{H}{L}$
64	$\frac{3}{2}$ $\frac{2}{2}$		5th $\overline{4} \overline{1} \overline{7}$	$\frac{H}{L}$
65	$\frac{1}{2}$ $\frac{6}{2}$		5th—4th	$\frac{H}{L}$
66	$\frac{8}{2}$		$\overline{4} \overline{1} \overline{5}$ $\underline{4th}$	$\frac{H}{L}$
67	$\frac{3}{2}$ $\frac{2}{2}$		5th $\overline{4} \overline{1} \overline{7}$	$\frac{H}{L}$
68	$\frac{16}{2}$		5th—4th	$\frac{H}{L}$
69	$\frac{8}{2}$		$\overline{4} \overline{1} \overline{5}$ $\underline{4th}$	$\frac{H}{L}$

INDEX TO FORMS.

MACHINE-FOLDED MUSIC.

Right-Angle—Double Short Backfold.

No.	Movement and No. of Pages in Form	Initial Point.	Checks.	
			5th—4th	L-H
70			5th <hr/> 4th	H <hr/> L
71			5th <hr/> 4th	H <hr/> L
72			5th <hr/> 4th	H <hr/> L
73			5th <hr/> 4th	H <hr/> L

INDEX TO FORMS.

COMBINATION MOVEMENTS.

THE DOUBLE SIXTEEN.

No.	No. of Pages in Form.	Initial Point.	Checks.	
			5th—4th	L-H
74	$2 \times \frac{1\ 6}{2}$		$\overline{4} \overline{5} \underline{4th}$	L H
75	$2 \times \frac{8}{2}$		5th 4th	L H
THE QUADRUPLE SIXTEEN.				
76	$4 \times \frac{1\ 6}{2}$		$\overline{4} \overline{5} \underline{4th}$	L H
THE DUPLEX THIRTY-TWO.				
77	$2 \times \frac{3\ 2}{2}$		$\overline{4} \overline{5} \underline{4th}$	L H
78	$2 \times \frac{3\ 2}{2}$		$\overline{4} \overline{5} \underline{4th}$	L H
79	$2 \times \frac{3\ 2}{2}$		5th 4th	L H
A 32/2 MUSIC FOLD.				
80	$\frac{3\ 2}{2}$		$\overline{4} \overline{5} \underline{4th}$	L H
A 16/2 MUSIC SPECIAL.				
81	$\frac{1\ 6}{2}$		$\overline{4} \overline{5} \underline{4th}$	L H

INDEX TO FORMS.

THE (K) SERIES—16-p. PARALLEL.

Three Parallel Folds Across Perfected Sheet.

No.	Move-ments.	INITIAL POINT,	Checks. 5th—4th	Graph.
82	(K) $\frac{1\ 6}{2}$		4th 5th †
83	(K-1) $\frac{1\ 6}{2}$		4th 5th
84	(K-2) $\frac{1\ 6}{2}$		5th 4th
85	(KK) $\frac{1\ 6}{2}$		5th 4th

EIGHT-PAGE PARALLEL.

Two Folds Across Sheet.

No.	Move-ments.	INITIAL POINT.	Checks. 5th—4th	Graph.
86	(K) $\frac{8}{2}$		5th 4th †
87	(KK) $\frac{8}{2}$		5th 4th

INDEX TO FORMS.

THE (K) SERIES $\frac{1}{2}$ PARALLEL.

No.	Move-ments.	INITIAL POINT.		Graph.
		Main Sec.	Star Sec.	
88	(K) $\frac{1\ 2}{2}$	First Fold at Left of Center Line. <div style="display: inline-block; vertical-align: middle;"> </div>	<div style="display: inline-block; vertical-align: middle;"> </div>	
89	(K-1) $\frac{1\ 2}{2}$	<div style="display: inline-block; vertical-align: middle;"> </div>	<div style="display: inline-block; vertical-align: middle;"> </div>	
90	(K-2) $\frac{1\ 2}{2}$	<div style="display: inline-block; vertical-align: middle;"> </div>	<div style="display: inline-block; vertical-align: middle;"> </div>	
91	(K-3) $\frac{1\ 2}{2}$	<div style="display: inline-block; vertical-align: middle;"> </div>	<div style="display: inline-block; vertical-align: middle;"> </div>	
92	(K-4) $\frac{1\ 2}{2}$	First Fold at Center Line. <div style="display: inline-block; vertical-align: middle;"> </div>	<div style="display: inline-block; vertical-align: middle;"> </div>	
93	(K-5) $\frac{1\ 2}{2}$	<div style="display: inline-block; vertical-align: middle;"> </div>	<div style="display: inline-block; vertical-align: middle;"> </div>	
94	(K-6) $\frac{1\ 2}{2}$	First Fold at Right of Center Line. <div style="display: inline-block; vertical-align: middle;"> </div>	<div style="display: inline-block; vertical-align: middle;"> </div>	
95	(KK) $\frac{1\ 2}{2}$	<div style="display: inline-block; vertical-align: middle;"> </div>	<div style="display: inline-block; vertical-align: middle;"> </div>	

INDEX TO FORMS.

THE (L) SERIES — 16-p. PARALLEL.

Three Folds Lengthwise of Perfected Sheet.

No.	Move- ments.	INITIAL POINT.	Checks. 5th—4th	Graph.
96	(L) $\frac{1\ 6}{2}$		4th : 5th †
97	(L-1) $\frac{1\ 6}{2}$		4th : 5th
98	(L-2) $\frac{1\ 6}{2}$		5th : 4th
99	(LL) $\frac{1\ 6}{2}$		5th : 4th

EIGHT-PAGE PARALLEL.

Two Folds Lengthwise of Perfected Sheet.

No.	Move- ments.	INITIAL POINT.	Checks. 5th—4th	Graph.
100	(L) $\frac{8}{2}$		5th : 4th †
101	(LL) $\frac{8}{2}$		5th : 4th

INDEX TO FORMS.

THE (L) SERIES $\frac{1}{2}$ PARALLEL.

No.	Move-ments.	INITIAL POINT.		Graph.
		Main Sec.	Star Sec.	
102	(L) $\frac{1}{2}$	First Fold at Left of Center Line. <div> <div>gg</div> <div>bb</div> </div>	<div> <div>St'r E</div> <div>= 3rd D</div> </div>	
103	(L-1) $\frac{1}{2}$		<div> <div>St'r gg</div> <div>= 5th bb</div> </div>	
104	(L-2) $\frac{1}{2}$		<div> <div>St'r H</div> <div>= 5th A</div> </div>	
105	(L-3) $\frac{1}{2}$		<div> <div>St'r F</div> <div>= 5th C</div> </div>	
106	(L-4) $\frac{1}{2}$		<div> <div>St'r H</div> <div>= 5th A</div> </div>	
107	(L-5) $\frac{1}{2}$		<div> <div>St'r F</div> <div>= 5th C</div> </div>	
108	(L-6) $\frac{1}{2}$		<div> <div>St'r E</div> <div>= 5th D</div> </div>	
109	(LL) $\frac{1}{2}$	First Fold at Right of Center Line. <div> <div>E</div> <div>D</div> </div>	<div> <div>St'r gg</div> <div>= 3rd bb</div> </div>	

ANNOTATIONS TO THE FORM INDEX,

The tables constituting the Index to Forms require but little explanation beyond that conveyed in the headings. The first column is a serial number for convenient reference. The second gives the number of pages in the form, printed as a "half sheet". The third column gives the initial point of each section included in the form, and, in the case of a compound form, the page number of the form—counting from the first—on which the initial page of the star section falls. The fourth column gives, as checks, the position-relation between the fourth and fifth pages of each section; also of lowest and highest numbered pages of form. For example, taking No. 45: If a thirty-two-page sheet takes in folding the movement shown by figure at top of the page on which No. 45 occurs, all the sheets shown on that page are folded by that movement. The Index for No. 45 would be read— "No. 45 is a twenty-four-page half sheet; it has the initial page of its main section at the lower left of F; its star section begins with the third page of the form and is located at the upper right-hand corner of B, the star section occupying the upper half of group-spaces A, B, C, D, [this part occupancy being indicated by the broken square]. The main section has its fourth and fifth pages immediately head to head, while the star section has its fourth and fifth pages immediately side by side; the lowest and highest numbered pages of the form are side by side." And so with any one of the one hundred and ten in the Index, an equally complete statement is condensed into the brief symbolized expression in the one line opposite the serial number of the form.

To identify the movement of sheet through any machine, mark both folder-guide edges of a thirty-two-page sheet and run through; the position of initial page is apparent; the sheet movement may be identified by consulting Table III and the Index.

No. 6—Is a useful form of convenient handfold where forty-eight-pages are required to be folded up in a single binder's section. It occupies group-spaces A to H for the main section, and AA to DD for the star section. For convenience a folding marker should be placed in the form on the collating fold between 14th and 17th. All groups are square.

No. 7.—This is a 24/2 for handfold. The main section occupies group-spaces E, F, G, H, while the star section uses the upper half of A to D,

and its pages foot in against the main section. The groups are long. The collating fold is the first made, which brings the head of the star section (on the sheet) against the marker between 14th and 17th.

No. 8.—Another 24/2 with infolded star section.
..... The main section occupies group-spaces A, B, G, H, and the star section C, F. The groups are square. Folding marker is on collating fold between 14th and 17th. Proportions of page and sheet will determine the choice between Nos. 7 and 8.

No. 9.—A 12/2 handfold, with main section occupying group-spaces G and H, and star section upper half of A and B. Marker between 2nd and 5th. The 12/2 is usually an undesirable form, as it requires an accurate squaring of the sheet so that it may be "tumbled" in turning—i. e., two different edges fed to grippers—or the form must be turned around on press and a new make-ready before printing the second side, in order to secure register.

No. 13.—Is a 4/2 music for hand folding. As indexed it is a two-on; and this for the reason that its principal use is for covers for oblong catalogues, etc. (sometimes in two or more colors) where the "tumble" turn of the single 4/2 would lose register. The two-on imposition may be used with a single set of plates or pages by substituting space for the second set, alternately, using double-size sheet, shifting gauges on press and running second impression. The sheet will then perfect by the regular manner of turning.

Nos. 21, 29, 37, 45.—The last of these was used to exemplify the manner of reading the Index, on p. 68. Its full description is given there. All four are useful 24/2 for right-angle folders, and all have a similar construction to No. 45, except that the initial points change with the movements by which they are handled.

Nos. 22, 30, 38, 46.—These are the 12/2 forms producing sheets whose star sections consist of two single leaves after trimming. (See p. 9.)

Nos. 23, 31, 39, 47.—These are duplex 32/2 two-on forms for their respective folds, where the right-angle machine has attachments for substituting a third or fourth fold parallel to the preceding fold for the third or fourth at a right angle. The duplex 24/2 and 16/2 following the above numbers in each table are forms whose sheets undergo a like process.

Nos. 58 to 73—Cover a series of forms for the several movements for the production of music- or oblong-page work; but they have a double backfold, suitable for sidestitched work only. Two-(or-more-)on, single short backfold, may, of course,

be produced on right-angle machines by substituting two or more pages of each number (best considered as fractional pages—see note, p. 15) for the single page of the long backfold, using that imposition.

No. 74.—This form produces a sheet which takes its first fold parallel to axis, dividing into two parts on folder. The second and third folds, on each half, follow, at a right angle to the first and to one another, delivering as two sixteen-page sections. By so grouping the two sections that they inset, a thirty-two-page binder's section is produced.

No. 75.—This gives a sheet which is folded on the same combination machine as No. 74, using the first and second folds. It is a duplex 8/2, grouped to inset, thus producing a single sixteen-page binder's section.

No. 76.—This is a multiple form of four sixteen- page sections. The perfected sheet takes its first and second folds parallel to the axis, splitting into four parts (or leaving in gangs, if desired), each part taking its third fold at a right angle to the second. The same movement, when the form is grouped for inseting, gives duplex thirty-two-page sections instead.

No. 77.—When used as quadruple sixteen this is the same as No. 76, but as duplex thirty-two it differs in the direction of movement by which the insert is made. In the duplex sixteen and quadruple sixteen machines, when used to insert sixteens so as to produce assembled sections of one thirty-two or two thirty-twos, respectively,—or, on the former, to insert eights so as to produce one assembled section of sixteen—the manner of movement of combining parts in inseting must be known, so that the sections may be assigned proper relative positions in the form. This is best determined for each machine.

No. 79.—The sheet from this form, like that from No. 74, takes its first fold parallel to the axis, splits, and each half folds by a (YY) movement directly as a thirty-two.

Nos. 80 and 81—Produce sheets for single short backfold or music, the same when finished as handfolded Nos. 10 and 11, respectively.

Nos. 82 to 109—the (K) and (L) Series.—The first line in each of the three (K) and three (L) tables gives the standard movement, which is in general use. The remainder of those tables are theoretical movements, but some of these folds can be produced by the standard machine by suitable manipulation of the sheet upon the folder. †In all the parallel-fold forms the lowest and highest numbered pages are side by side. In all the 12/2 forms, both (K) and (L), the 5th and 4th pages of the main section are immediately side by side. In the tables

of these parallel folds, in column under the heading "Graph", is presented, in each line, a figure which shows the direction of movement corresponding to the imposition indicated by the remainder of the line: the + mark at the right or left of this figure in the 12/2 tables indicates the side of the center line on which the first fold is placed in the sheet.

Nos. 85, 87, 95, 99, 101, 109. — The sheets from these can be folded on the standard (K) and (L) movements by reversing sheet and feeding opposite edge to folder guide. This fold places the first page of form on the free corner of the sheet, and is, therefore useful for unstitched folders on which the pages stand consecutively side by side — i. e., an "around-the-sheet" imposition. In order to be folded on standard machine the forms represented by above numbers must have their halves transposed transversely to axis, and the gripper edge changed in locking, so as to reverse true edges of sheet.

Nos. 89, 91, 103, 105, all 12/2 — Can also be folded on the standard (K) and (L) movements. This gives a map fold, which, for some purposes, is preferable. These sheets, as thus folded upon the standard machine, are placed upon the folder with the lowest-numbered page upward, and take the first fold at the right of center line. To get true edges for folder guides — Nos. 91 and 105 require transposition of halves and change of gripper edge; No. 89 requires transposition of halves but no change in gripper edge; No. 103 requires change of gripper edge only.

Nos. 92, 106. — These are useful forms which, as indexed, can be folded on the standard movement by placing first fold at right of center line. The sheet is laid with lowest-numbered page uppermost upon the folder.

No. 94 — Can be folded upon standard movement by change of gripper edge. This inverts the sheet upon the folder (lowest-numbered page upward). The first fold is placed at right of center line of sheet.

No. 108 — May be folded on standard movement by transposing halves transversely to axis — gripper edge remaining the same. This has the effect of reversing and inverting the sheet upon the folder table, so as to present true edges to guides. The first fold is placed at right of center.

GROUPING FORMULÆ

This subject is discussed on pp. 22-24, and exemplified by a formula for a 32/2 as a single section and one for a 32/2 as a collated section of two sixteens insetted. These are given here, together with tables for other simple and compound forms. Multiple forms, of course, are but repetitions of simple sections.

A 32/2 in a single section:

$$\begin{array}{r}
 4 \) \ 32 \ (\ 8 \\
 \hline
 16 \ . \ . \ . \ \wedge \ . \ . \ . \ 16 \\
 \hline
 + \ 1 - 32 - 17 - 16 \\
 \quad 2 - 31 - 18 - 15 - \\
 \quad 3 - 30 - 19 - 14 - \\
 + \ 4 - 29 - 20 - 13 \\
 + \ 5 - 28 - 21 - 12 \\
 \quad 6 - 27 - 22 - 11 - \\
 \quad 7 - 26 - 23 - 10 - \\
 + \ 8 - 25 - 24 - \ 9
 \end{array}$$

A 32/2 in two sixteens, insetted:

$$\begin{array}{r}
 4 \) \ 32 \ (\ 8 \\
 \hline
 8 \ . \ . \ . \ \wedge \ . \ . \ . \ 8 \\
 \quad . \ . \ . \ . \ 16 \ . \ . \ . \ . \\
 \hline
 + \ 1 - 32 - 25 - \ 8 \\
 \quad 2 - 31 - 26 - \ 7 - \\
 \quad 3 - 30 - 27 - \ 6 - \\
 + \ 4 - 29 - 28 - \ 5 \\
 + \ 9 - 24 - 17 - 16 \\
 \quad 10 - 23 - 18 - 15 - \\
 \quad 11 - 22 - 19 - 14 - \\
 + \ 12 - 21 - 20 - 13
 \end{array}$$

A 16/2 in a single section:

$$\begin{array}{r}
 4 \) \ 16 \ (\ 4 \\
 \hline
 8 \ . \ . \ . \ \wedge \ . \ . \ . \ 8 \\
 \hline
 + \ 1 - 16 - \ 9 - 8 \\
 \quad 2 - 15 - 10 - 7 - \\
 \quad 3 - 14 - 11 - 6 - \\
 + \ 4 - 13 - 12 - 5
 \end{array}$$

A 16/2 in two eights, insetted:

$$\begin{array}{r}
 4 \) \ 16 \ (\ 4 \\
 \hline
 4 \ . \ . \ . \ \wedge \ . \ . \ . \ 4 \\
 \quad . \ . \ . \ . \ 8 \ . \ . \ . \ . \\
 \hline
 + \ 1 - 16 - 13 - 4 \\
 \quad 2 - 15 - 14 - 3 - \\
 + \ 5 - 12 - \ 9 - 8 \\
 \quad 6 - 11 - 10 - 7 -
 \end{array}$$

An 8/2 in a single section:

$$\begin{array}{r}
 4 \) \ 8 \ (\ 2 \\
 \hline
 4 \ . \ . \ . \ \wedge \ . \ . \ . \ 4 \\
 \hline
 + \ 1 - 8 - 5 - 4 \\
 \quad 2 - 7 - 6 - 3 -
 \end{array}$$

An 8/2 in two fours, insetted:

$$\begin{array}{r}
 4 \) \ 8 \ (\ 2 \\
 \hline
 2 \ . \ . \ . \ \wedge \ . \ . \ . \ 2 \\
 \quad . \ . \ . \ . \ 4 \ . \ . \ . \ . \\
 \hline
 + \ 1 - 8 \ | \ 7 - 2 - \\
 - \ 3 - 6 \ | \ 5 - 4 +
 \end{array}$$

A four-page form (4/2) is, of course, a single group, the pairs lying on opposite sides of axis:

$$\begin{array}{r}
 + \ 1 - 4 \ | \ 3 - 2 - \\
 \hline
 \end{array}$$

The forms for insetted sections of the kind above are in reality multiple forms, one section being an

exact duplicate—in arrangement—of the other, except as to the numbers of the pages. There is a separate initial point for each section. Index Nos. 74 and 75 are additional examples.

Index No. 6—

A forty-eight-page half sheet, is grouped:

4) 48 (12

4	.	.	.	^	.	.	.	4
*	.	4	.	.	^	.	.	4
.	.	8	.	.	^	.	.	8
*	.	.	4	.	^	4	.	.
.	.	.	.	8	.	.	.	.
<hr/>								
+	1	—	48	—	25	—	24	
	2	—	47	—	26	—	23	—
	3	—	46	—	27	—	22	—
+	4	—	45	—	28	—	21	
*	5	—	44	—	29	—	20	—
+	6	—	43	—	30	—	19	
+	7	—	42	—	31	—	18	
	8	—	41	—	32	—	17	—
+	9	—	40	—	33	—	16	
	10	—	39	—	34	—	15	—
	11	—	38	—	35	—	14	—
+	12	—	37	—	36	—	13	

No. 7, a 24/2—

4) 24 (6

2	.	.	.	^	.	.	.	2
*	.	2	.	.	^	.	.	2
.	.	4	.	.	^	.	.	4
*	.	.	2	.	^	2	.	.
.	.	.	.	4	.	.	.	.
<hr/>								
+	1	—	24	—	13	—	12	
	2	—	23	—	14	—	11	—
*	3	—	22	—	15	—	10	—
+	4	—	21	—	16	—	9	
	5	—	20	—	17	—	8	—
+	6	—	19	—	18	—	7	

No. 9, a 12/2—

4) 12 (3

2	.	.	.	^	.	.	.	2
*	.	2	.	.	^	.	.	2
.	.	.	.	4	.	.	.	.
<hr/>								
+	1	—	12	—	7	—	6	
	2	—	11	—	8	—	5	—
—*	3	—	10	—	9	—	4	+

No. 8, a 24/2—

4) 24 (6

4	.	.	.	^	.	.	.	4
*	.	4	.	.	^	.	.	4
.	.	.	.	8	.	.	.	.
<hr/>								
+	1	—	24	—	13	—	12	
	2	—	23	—	14	—	11	—
	3	—	22	—	15	—	10	—
+	4	—	21	—	16	—	9	
*	5	—	20	—	17	—	8	—
+	6	—	19	—	18	—	7	

Nos. 21, 29, 37, 45—

Twenty-four-page half sheets—

4) 24 (6

2	.	.	.	^	.	.	.	2
*	.	4	.	.	^	.	.	4
.	.	.	.	12	.	.	.	.
<hr/>								
+	1	—	24	—	13	—	12	
	2	—	23	—	14	—	11	—
*	3	—	22	—	19	—	6	—
+	4	—	21	—	20	—	5	
	7	—	18	—	15	—	10	—
+	8	—	17	—	16	—	9	

Nos. 22, 30—

Twelve-page half sheets—

4) 12 (3

2	.	.	.	^	.	.	.	2
*	.	4	.	.	^	.	.	4
.	.	.	.	4	.	.	.	.
<hr/>								
+	1	—	12	—	9	—	8	
	2	—	11	—	10	—	7	—
—*	3	—	6	—	5	—	4	+

Nos. 38, 46—

Twelve-page half sheets—

4) 12 (3

2	.	.	.	^	.	.	.	2
*	.	0	.	.	^	.	.	4
.	.	.	.	4	.	.	.	.
<hr/>								
+	1	—	12	—	5	—	4	
	2	—	11	—	6	—	3	—
—*	7	—	10	—	9	—	8	+

Nos. 24, 32, 40, 48—
Duplex twenty-four-
page half sheets, two-
on—

$$\begin{array}{r}
 4 \) \ 24 \ (\ 6 \\
 \hline
 8 \ . \ . \ . \ \wedge \ . \ . \ . \ 8 \\
 * \ . \ . \ . \ . \ 8 \ . \ . \ . \ . \\
 \hline
 + \ 1 - 24 - 17 - 8 \\
 \quad 2 - 23 - 18 - 7 - \\
 \quad 3 - 22 - 19 - 6 - \\
 + \ 4 - 21 - 20 - 5 \\
 + \ *9 - 16 - 13 - 12 \\
 \quad 10 - 15 - 14 - 11 -
 \end{array}$$

Nos. 51, 53, 55, 57—
Twenty-four-page half
sheets—

$$\begin{array}{r}
 4 \) \ 24 \ (\ 6 \\
 \hline
 6 \ \ddot{} \ \wedge \ \ddot{} \ 6 \\
 * \ \ddot{} \ 4 \ \wedge \ 4 \ \ddot{} \\
 \quad \ddot{} \ \ddot{} \ 4 \ \ddot{} \ \ddot{} \\
 \hline
 + \ 1 - 24 - 13 - 12 \\
 \quad 2 - 23 - 14 - 11 - \\
 \quad 3 - 22 - 19 - 6 - \\
 + \ 4 - 21 - 20 - 5 \\
 *7 - 18 - 15 - 10 - \\
 + \ 8 - 17 - 16 - 9
 \end{array}$$

Nos. 88, 95, 102,
109, (K)12/2, (L)12/2—

$$\begin{array}{r}
 4 \) \ 12 \ (\ 3 \\
 \hline
 2 \ \ddot{} \ \wedge \ \ddot{} \ 2 \\
 * \ \ddot{} \ 2 \ \wedge \ 2 \ \ddot{} \\
 \quad \ddot{} \ \ddot{} \ 4 \ \ddot{} \ \ddot{} \\
 \hline
 + \ 1 - 12 - 7 - 6 \\
 \quad 2 - 11 - 8 - 5 - \\
 + *3 - 10 \mid 9 - 4 -
 \end{array}$$

Nos. 89, 91, 92, 94,
103, 105, 106, 108—
(K) 12/2, (L) 12/2—

$$\begin{array}{r}
 4 \) \ 12 \ (\ 3 \\
 \hline
 4 \ . \ . \ \wedge \ . \ . \ 4 \\
 * \ . \ . \ . \ 4 \ . \ . \ . \\
 \hline
 + \ 1 - 12 - 9 - 4 \\
 \quad 2 - 11 - 10 - 3 - \\
 + *5 - 8 \mid 7 - 6 -
 \end{array}$$

Nos. 90, 93, 104, 107,
(K) 12/2, (L) 12/2—

$$\begin{array}{r}
 4 \) \ 12 \ (\ 3 \\
 \hline
 4 \ . \ . \ \wedge \ . \ . \ 4 \\
 * \ . \ . \ . \ 4 \ . \ . \ . \\
 \hline
 + \ 1 - 12 - 9 - 4 \\
 \quad 2 - 11 - 10 - 3 - \\
 - *5 - 8 \mid 7 - 6 +
 \end{array}$$

No. 110, a Duplex
20/2, two-on—

$$\begin{array}{r}
 4 \) \ 20 \ (\ 5 \\
 \hline
 2 \ \ddot{} \ \wedge \ \ddot{} \ 2 \\
 * \ \ddot{} \ 2 \ \wedge \ 2 \ \ddot{} \\
 \quad \ddot{} \ \ddot{} \ 12 \ \ddot{} \ \ddot{} \\
 \hline
 + \ 1 - 20 - 11 - 10 \\
 \quad 2 - 19 - 12 - 9 - \\
 + *3 - 18 \mid 17 - 4 - \\
 \quad 5 - 16 - 13 - 8 - \\
 + \ 6 - 15 - 14 - 7
 \end{array}$$

What is true of the first section of any work, as to its formula, is true of its repetition any number of times the work requires, by substituting the page numbers in each successive section for those in the first as shown in its formula as above. The formulæ above all begin with page 1; in actual practice, of course, a section may start with some number greater than 1, or page 1 may be preceded by one or more blanks, and in writing the grouping table it will be started accordingly.

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